Rapport
Report

Oppdragsgiver *Client*	Utførende enhet/lab. *Department/laboratory responsible*
Nortek AS Vangkroken 2 1351 Rud	The National Institute of Technology Environmental Test Laboratory P.O. Box 1019 NO - 3601 KONGSBERG

Rapportnr. *Report no.*

3000-14-017757

Tittel *Title*

Environmental test report
Vibration test
Signature
S-55, S-500 and S-1000

Dato *Date*	Utarbeidet av *Prepared by*	Godkjent av *Approved by*	Innleveringsdato for prøve *Date of receipt of test object*
01.07.2014	Department 3000	Erik Haugejorden	30.06.2014
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Fordeling *Distribution*

Dag Skogbrott, Nortek; 1 pdf-file.

Teknologisk Institutt as

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1. Scope

The Environmental Test Laboratory at Teknologisk Institutt as has performed vibration test on Signature S-55 / S/N S-0011, S-500 / S/N D-0069 and S-1000 / S/N D-0086 for Nortek AS. The test was performed 30.06.2014.

The test was executed under accreditation granted by Norwegian Accreditation, accreditation no. Test 006, and was based on the general test requirements specified in IEC 60068-1 / IEC 60068-2-64.

The following personnel were present during the test:
Erik Haugejorden, Teknologisk Institutt AS.
Dag Skogbrott, Nortek AS.
Bengt Large, Nortek AS

2. Reference Documents

1. KS Handbook, Quality Manual for Teknologisk Institutt.
2. Environmental test report: 3010-09-0048, Teknologisk Institutt AS.
3. IEC 60068-1 General requirements, edition 7.0.
4. IEC 60068-2-64 Test Fh: Vibration, broad band random and guidance, edition 2.0.

3. Test Procedure

The environmental test equipment used during test with calibration status and measurement uncertainty figures is given in Appendix 1. The test items were mounted on the shaker as shown in figures 1-3. The test items were not powered during test. A visual inspection was performed after test. Functional test was performed at Nortek after test. The positions of control and response accelerometers are shown in figures 1-4.

MP1: Control accelerometer.
MP2: Response on S-55.
MP3: Response on S-1000.
MP4: Response on S-55.

The following test parameters were used:

Frequency range:	10 - 500Hz.
Excitation level:	10 - 200 Hz: 0.03 g2/Hz.
	200 - 500 Hz: 0.01 g2/Hz.
Grms:	2.95
Duration:	30 minutes in each of the 3 axes.

The recorded input and response records are given in Appendix 2.

4. Results

The test items were not operational during test. Mechanical inspection and functional tests were performed at Nortek after the test. Test results are evaluated by Nortek.

5. Conclusion

The test items were not operational during test. Mechanical inspection and functional tests were performed at Nortek after the test. Test results are evaluated by Nortek.

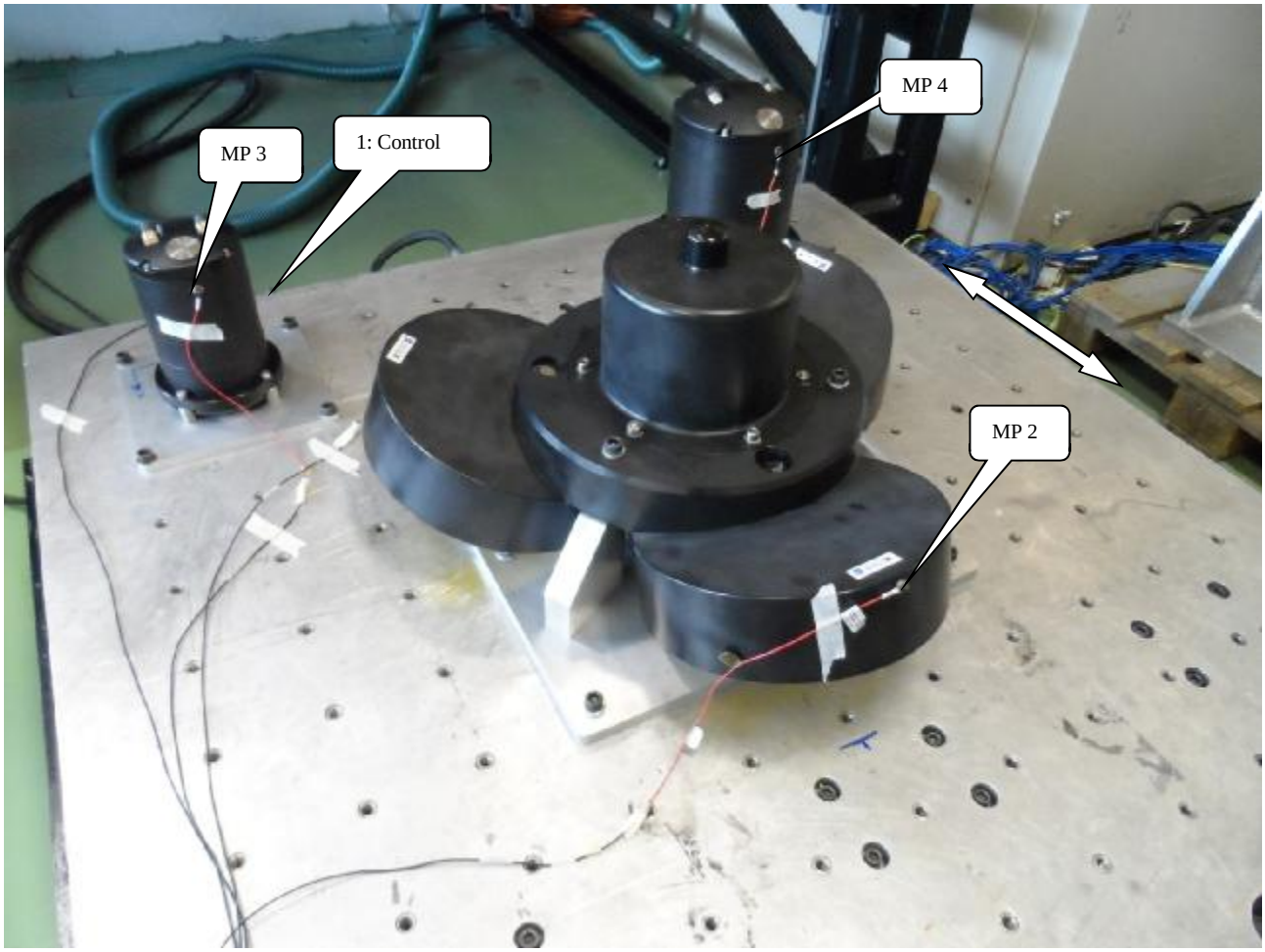


Figure 1.
Test items mounted for vibration test in x-axis.

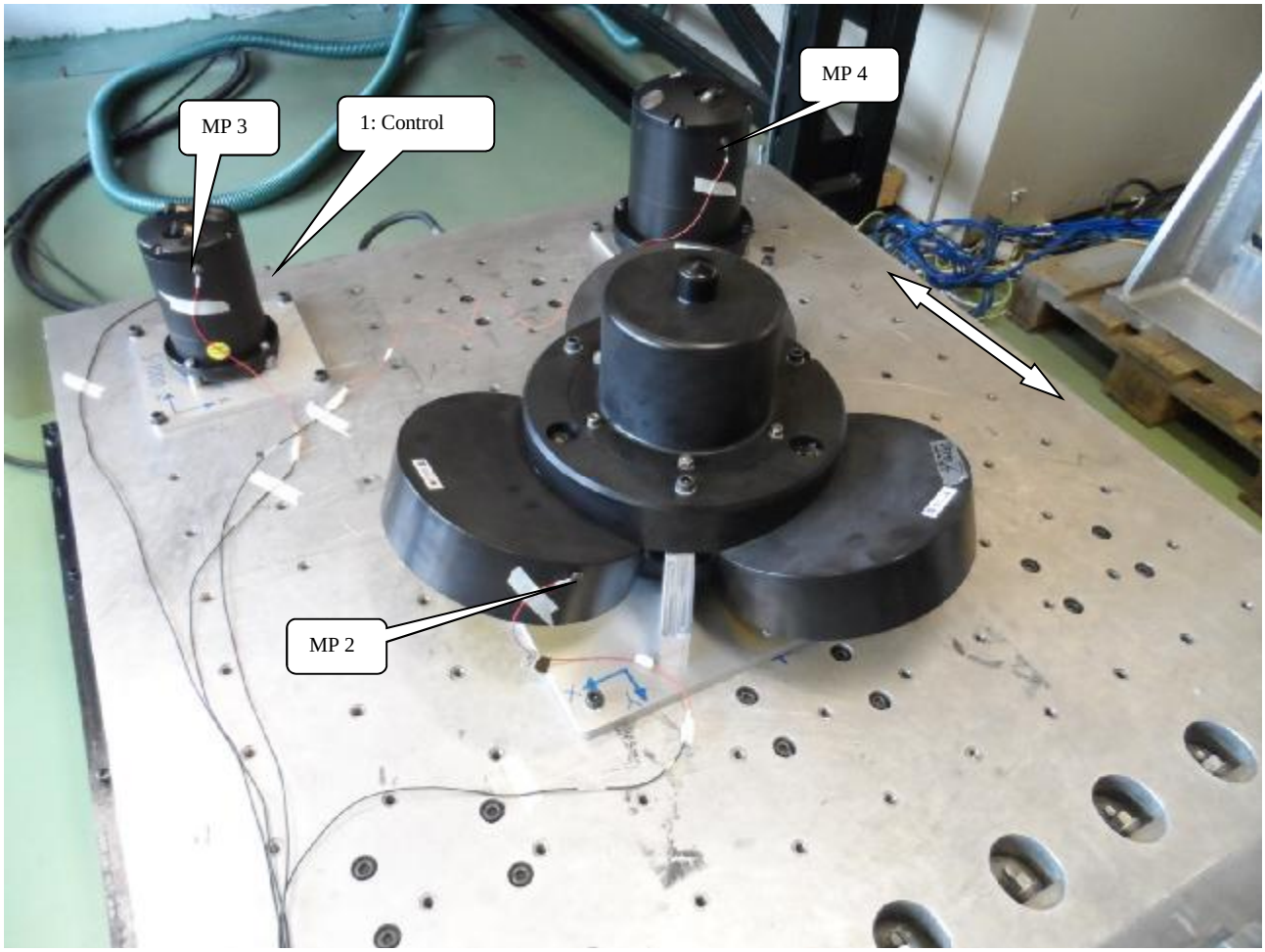


Figure 2.
Test items mounted for vibration test in y-axis.

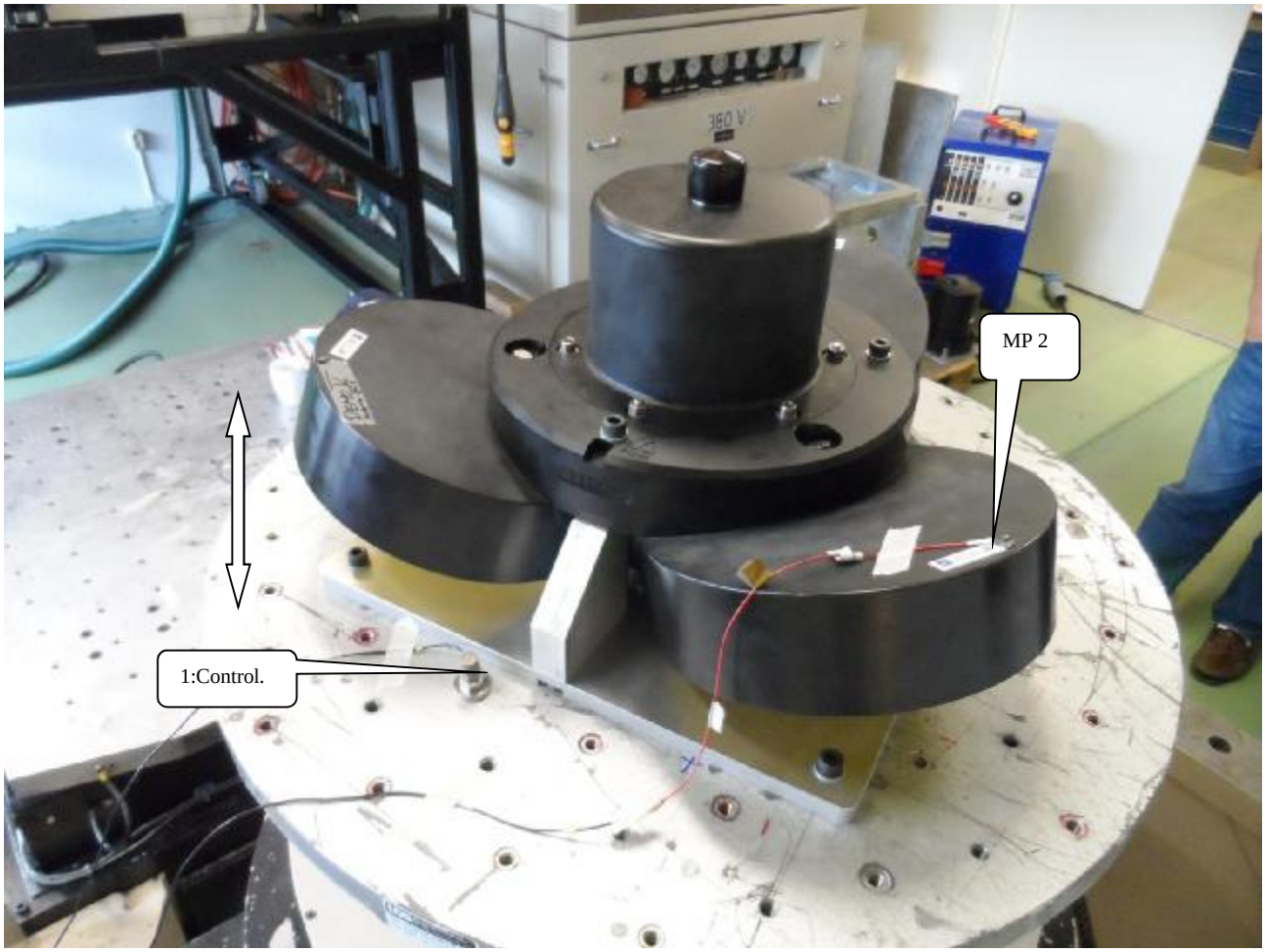


Figure 3.
S-55 mounted for vibration test in z-axis.

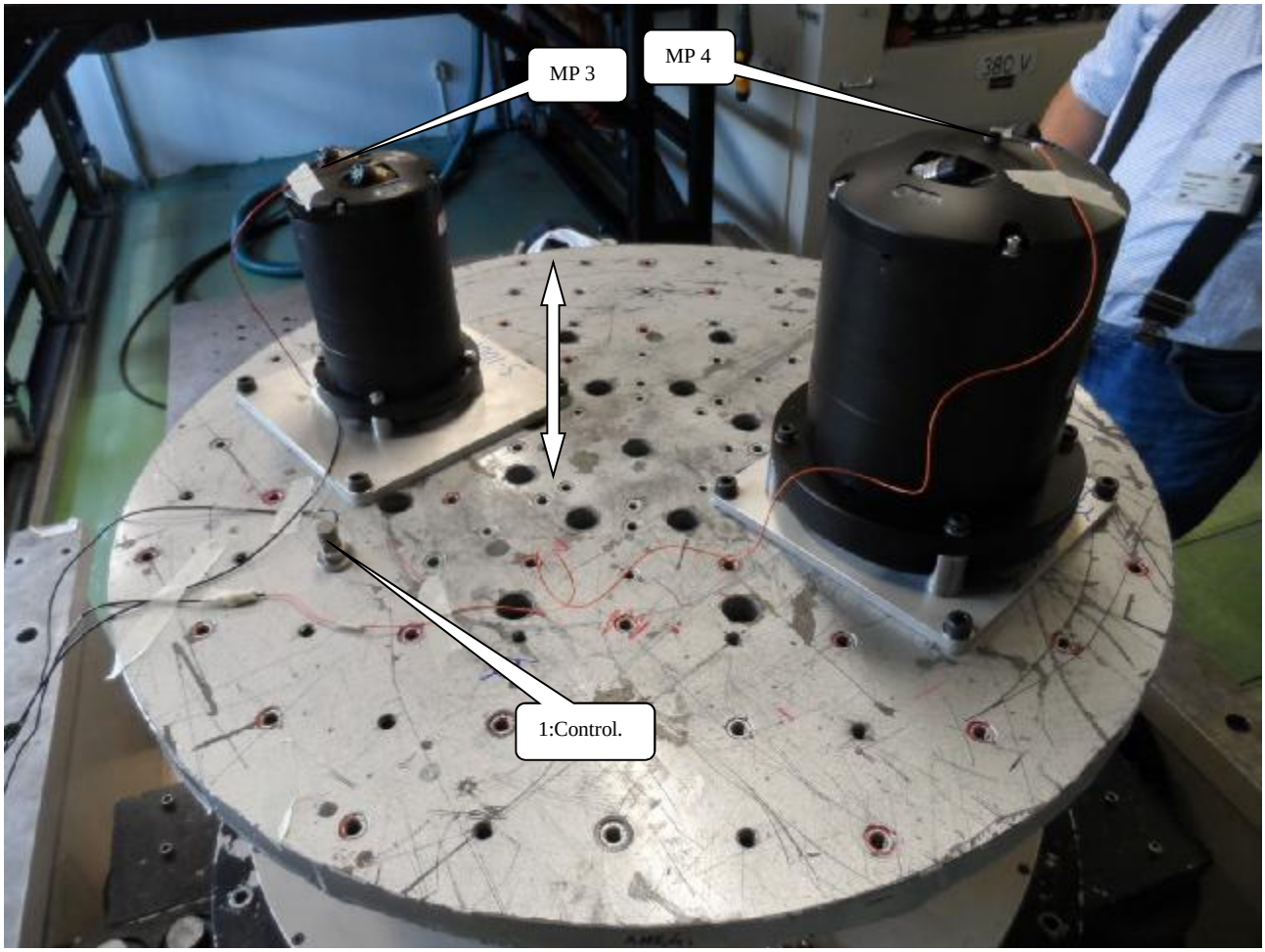


Figure 4.
S-500 and S-1000 mounted for vibration test in z-axis.

Appendix 1

Test Equipment

Vibrator

Int.no.0883	Vibrator	LDS 964 LS	Cal.: N.A.	
	Amplifier	LE 4014 E	Cal.: N.A.	
Int.no 15943	Vibration control sys	dp550	Cal.: 09.05.14	Interval: 6 months
Int.no.1974	Charge amplifier	BK 2626	Cal.: 13.12.13	Interval: 12 months
Int.no.1975	Charge amplifier	BK 2626	Cal.: 02.10.13	Interval: 12 months
Int.no.972	Charge amplifier	BK 2626	Cal.: 13.12.13	Interval: 12 months
Int.no.173699	Accelerometer	BK737	Cal.: 02.04.14	Interval: 12 months
Int.no.423352	Accelerometer	E628	Cal.: 19.02.14	Interval: 12 months
Int.no.423354	Accelerometer	E629	Cal.: 04.06.14	Interval: 12 months
Int.no.448239	Accelerometer	BK647	Cal.: 03.10.13	Interval: 12 months

Vibration fixtures were supplied by Nortek.

Table 1: Measurement uncertainty figures.

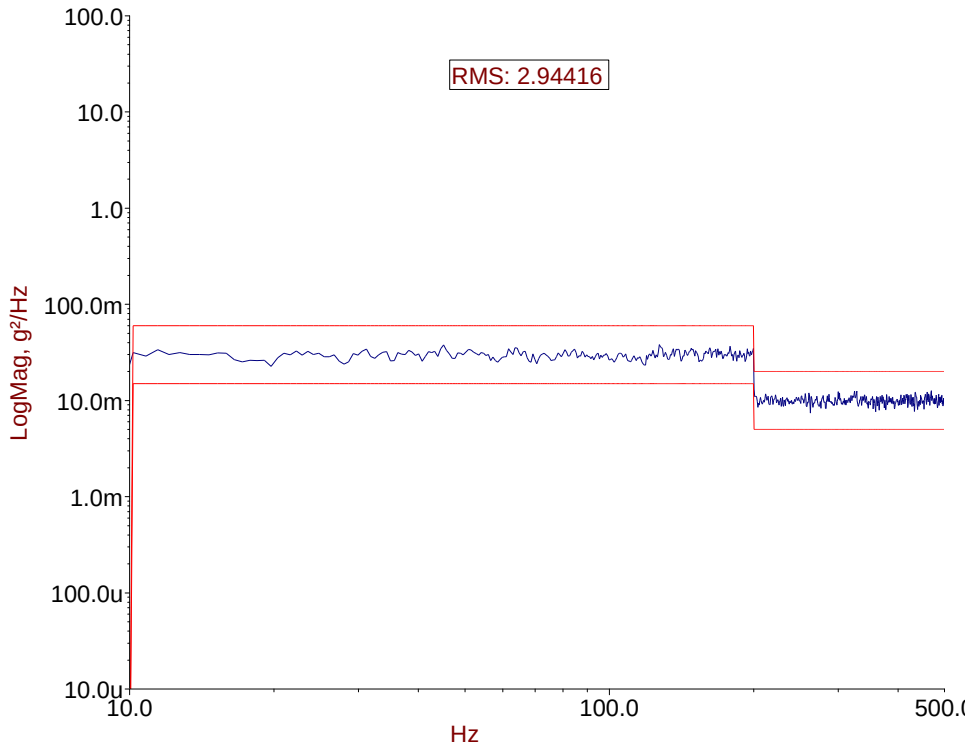
Parameter	**Uncertainty**	**Cover factor k**	**Remarks**
Acceleration	+/- 2,95 %	2	Figures based on specification and figures from calibration of individual items in measurement chain.
Frequency	+/- 0.01 %	2	Figures based on specification.

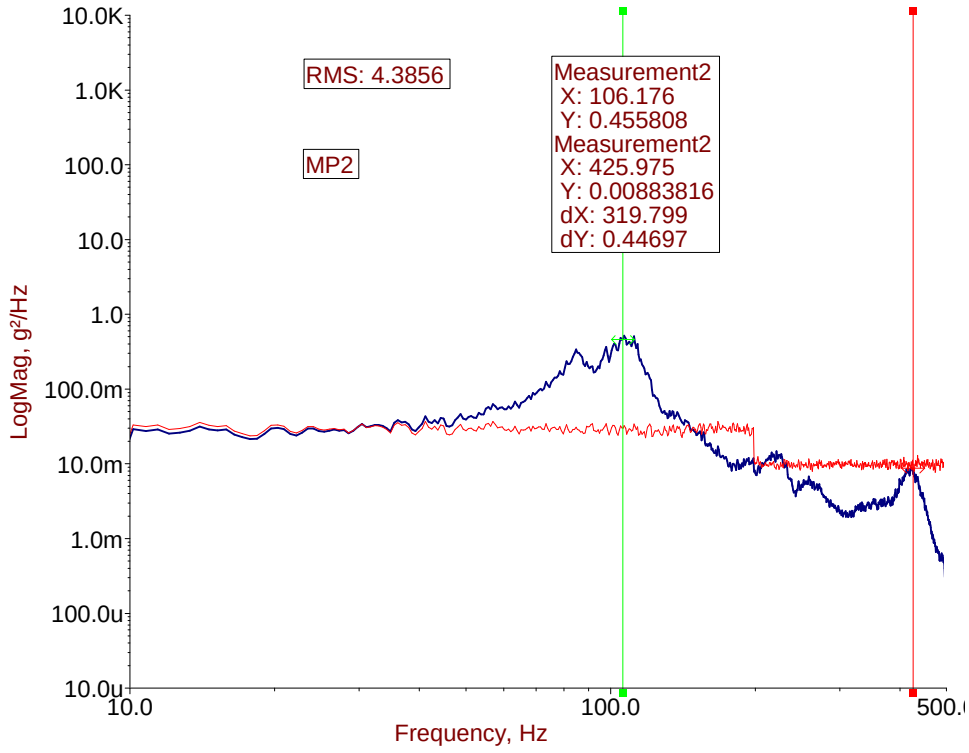
* Details from measurement uncertainty calculations can be forwarded on request.

Appendix 2

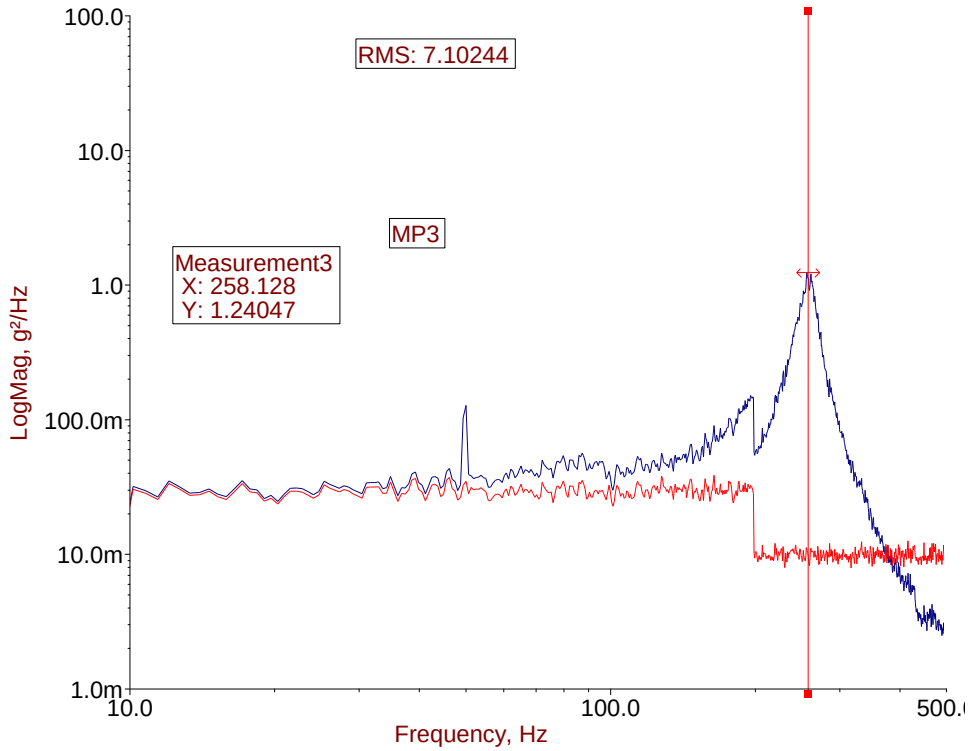
Test Records

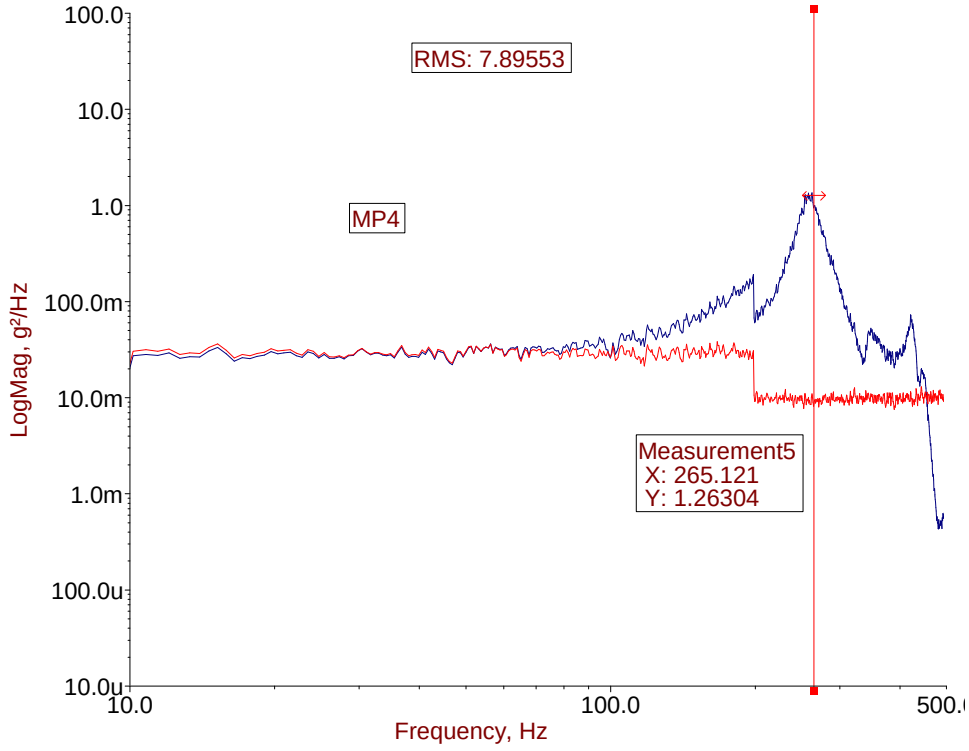
X-axis, S-55, S-500 and S-1000.



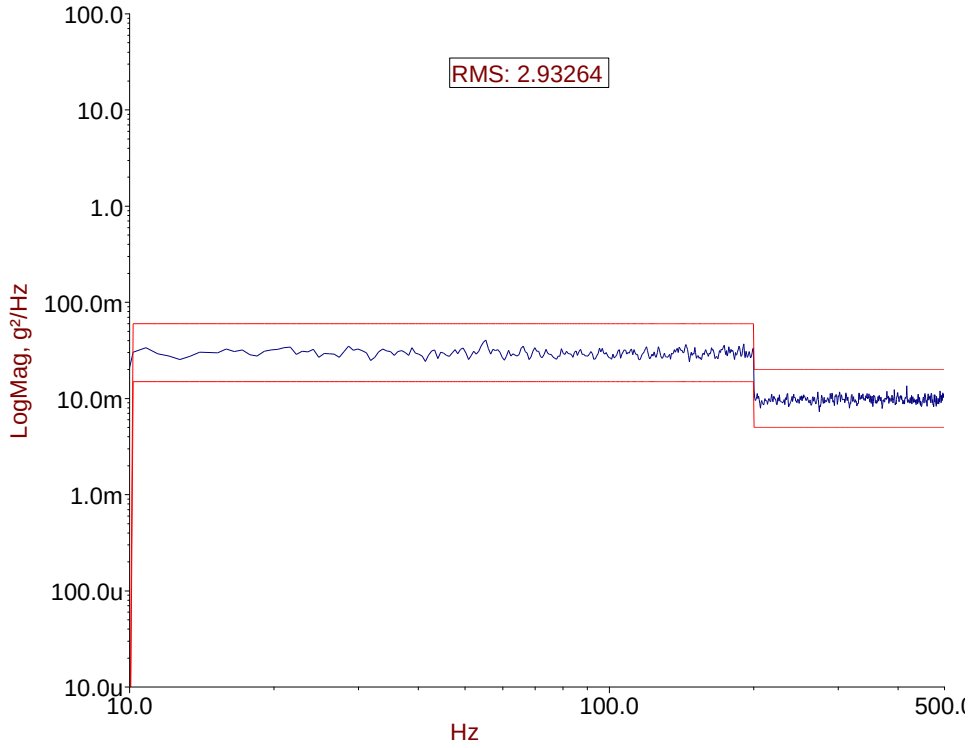


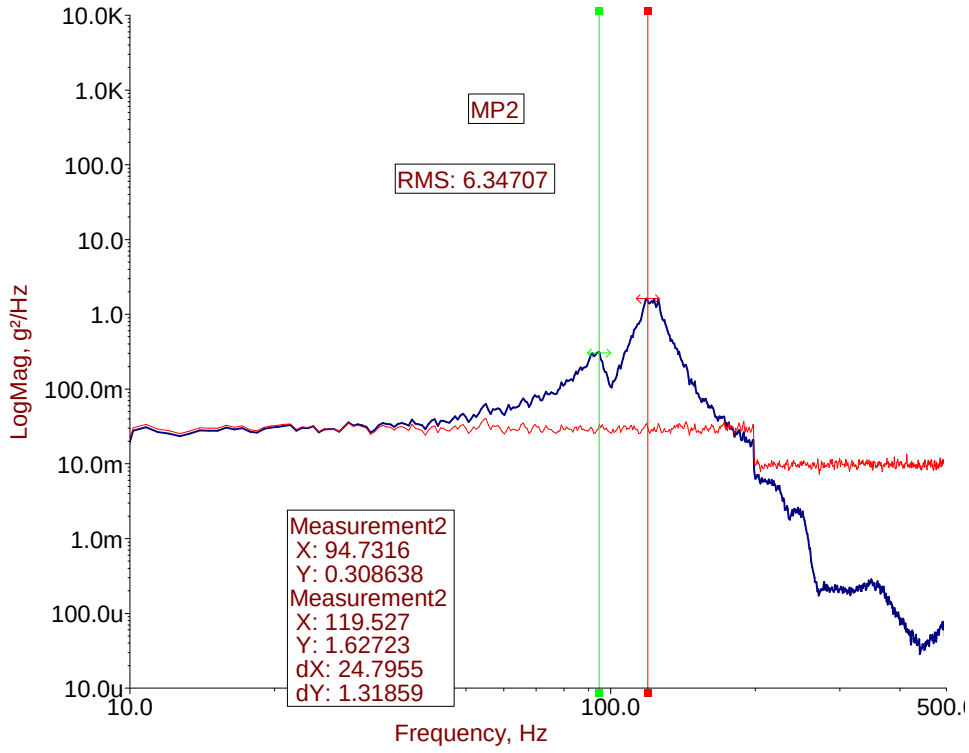
X-axis, S-55, S-500 and S-1000.



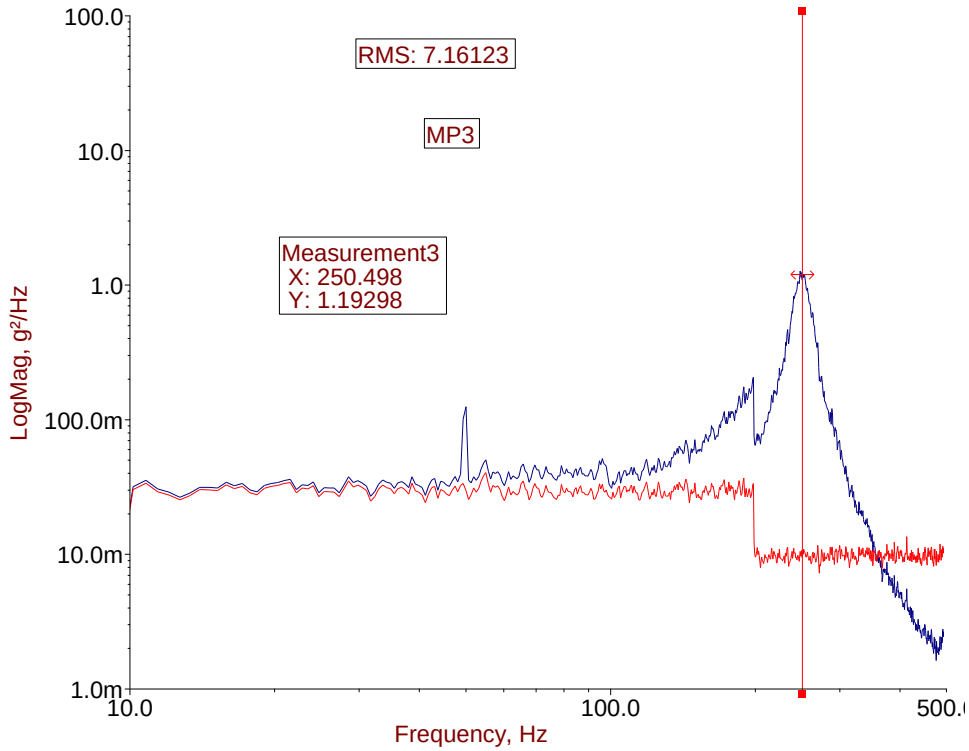


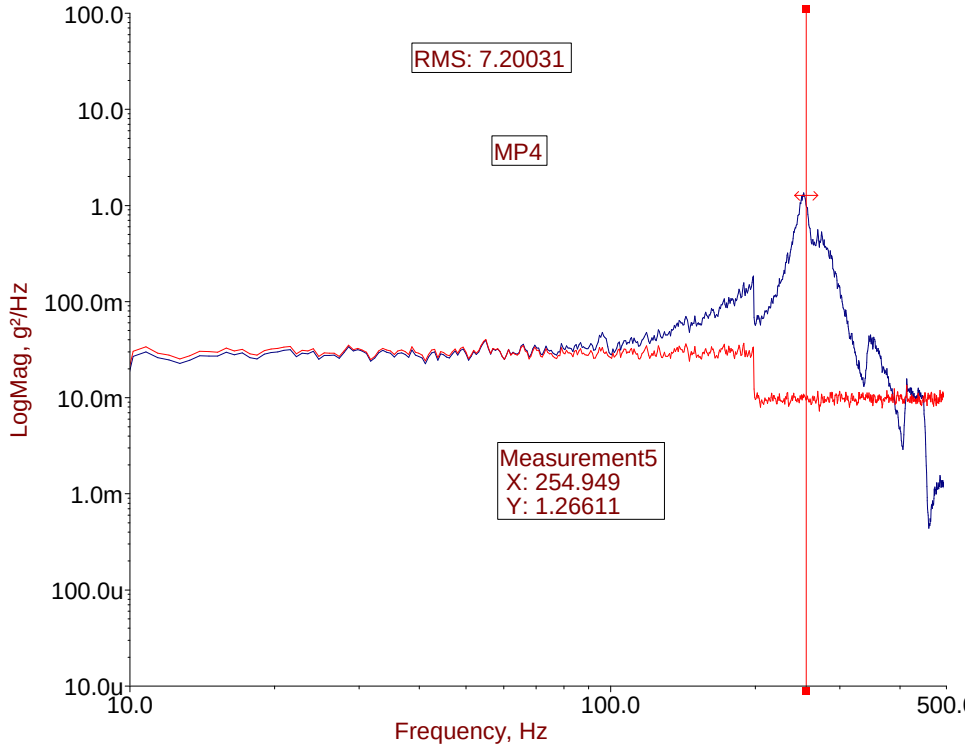
Y-axis, S-55, S-500 and S-1000



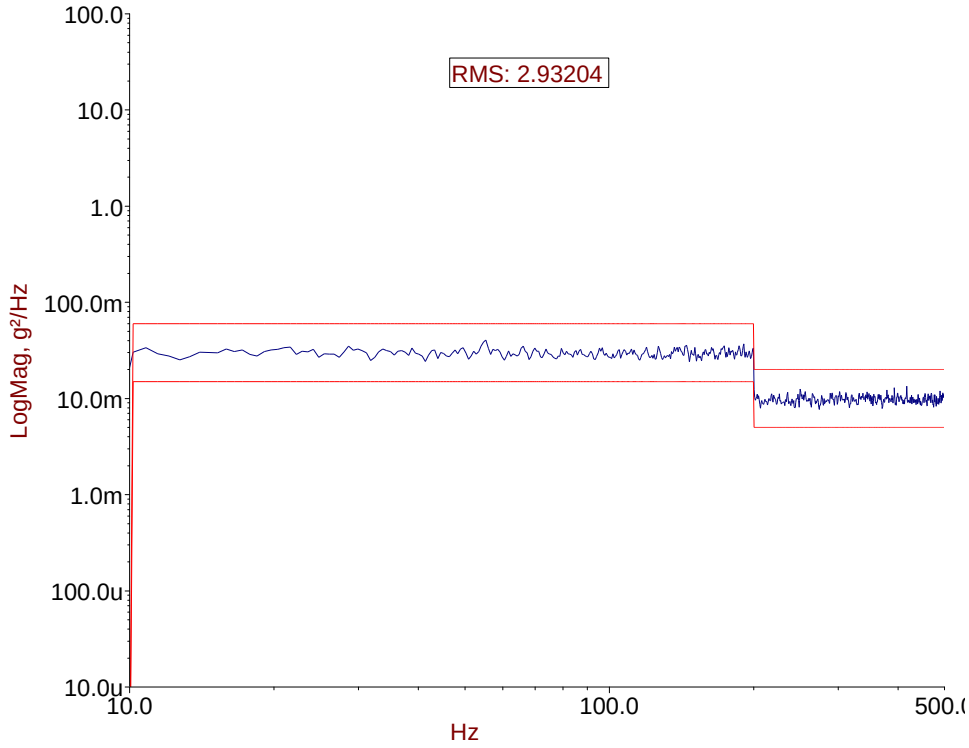


Y-axis, S-55, S-500 and S-1000.





Z-axis, S-55.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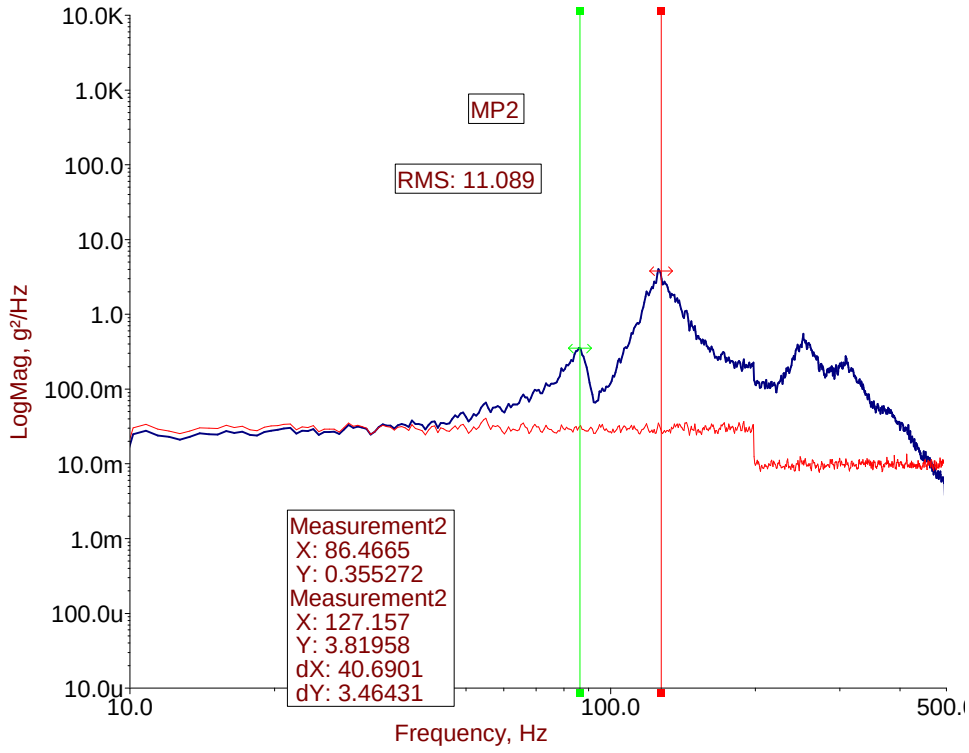
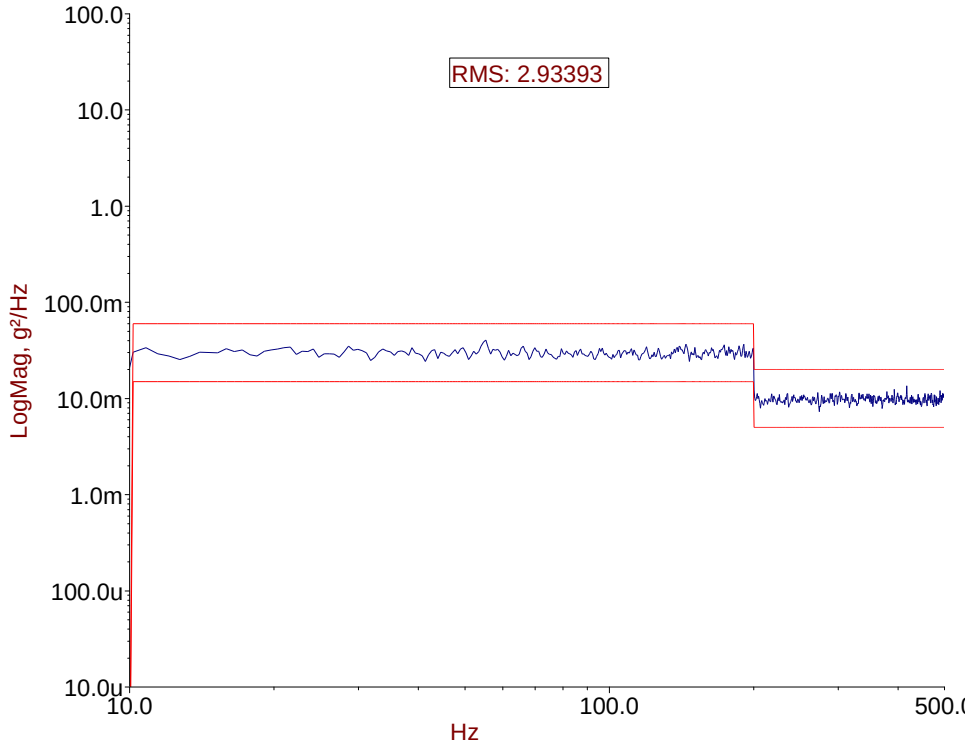
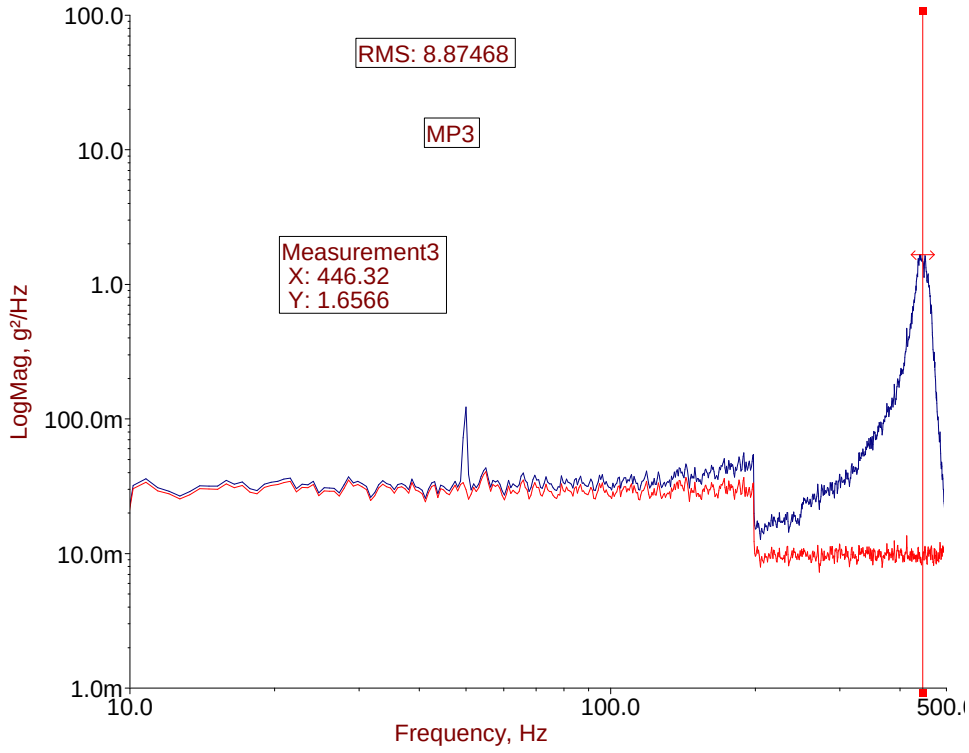
10.0
1.0
100.0m
10.0m
1.0m
100.0u
10.0u
LogMag, g²/Hz
10.0
100.0
500.(
Hz


10.0K
1.0K
100.0
10.0
1.0
100.0m
10.0m
1.0m
100.0u
10.0u
LogMag, g²/Hz
MP2
RMS: 11.089
Measurement2
X: 86.4665
Y: 0.355272
Measurement2
X: 127.157
Y: 3.81958
dX: 40.6901
dY: 3.46431
10.0
100.0
500.(
Frequency, Hz

Z-axis, S-500 and S-1000.





Z-axis, S-500 and S-1000.